

Birdseed Mining Activity

This exercise is adapted from the Nevada Division of Minerals and the Interstate Mining Compact Commission Education Workshop Notebook

Purpose:

Mining is a complex process in which relatively small amounts of valuable or useful minerals or metals (ores) are extracted from very large masses of rock. This activity will illustrate how this “needle in a haystack” process works.

Objective:

Students will have a “hands-on” experience in how difficult it is for miners to locate valuable mineral deposits. Students will also learn a simple lesson in economics – a less valuable commodity may be more profitable because it is more abundant. They will learn that there are a variety of costs in mining that must be included when calculating their profit. Students will learn that mining must be done in a clean and environmentally conscious manner or there will be consequences in the form of violations that will be deducted from their profits.

Materials Needed:

- ▶ Wild Birdseed – any commercial birdseed mix with sunflower seeds and a variety of other different seeds.
- ▶ Shallow pans such as pie or cake tins to hold the birdseed
- ▶ Small beads (approximately 2,4 or 6 mm) in colors of blue, gold, silver, and white. - Sizes can vary by color depending on age group and the level of difficulty that the activity leader wants for the exercise. The smaller the bead, the harder it will be to find in the birdseed.
- ▶ A piece of flipchart paper or similar sized paper for each group. - With a black marker, draw a “mine permit boundary” almost as large as the paper. All mining materials must be kept inside this boundary or violation tickets will be issued.
- ▶ Optional for older students: Rental mining equipment such as tweezers, plastic spoons, probes, paper cups, paper funnels. Some items might be more useful than others for the exercise. This fosters critical thinking skills because the equipment decisions made by the students can significantly improve or limit their profits.

Instructions:

1. Divide students into teams of 4-6 so that each student has a job listed in the “Student Instructions”. Adult activity leaders or specially appointed students will be the “government mine inspectors” and issue violations.
2. Pour approximately 1½ pounds of birdseed into each pan.
3. Add 2 gold beads, 4 silver beads, 6 blue beads, and 3 white beads to each pan and mix them into the birdseed. Do not tell students the number of beads in each pan. The beads represent different minerals and their values are listed on the “Student Instructions”. Sunflower seeds also have a value and can be mined. The remaining seeds are mine waste and must be “reclaimed” back into the “mine pit” (pan) at the end of the activity.
4. Students search through the seed mixture using any tools they are given, have available within their group (from student desks, notebooks, purses, backpacks, etc.) and tools they wish to “rent” from the “equipment shed” (if one is made available.)
5. Mine inspectors circulate throughout the groups issuing violations for any mined materials (birdseed) that leave the permit site, thus causing “environmental damage” at messy tables.
6. At the end of mining have the students calculate the costs (including violations) and profits of their mining. Set up the exercise so that everyone has a chance to make a profit. Fill in the “Birdseed Mining Financial Spreadsheet” and discuss the exercise. Prizes can be awarded for the best table of “miners”; those that made the most money with the least violations; most innovative mining practices; best reclamation, etc.

Estimated Timed Agenda:

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| 5 minutes | Review the “Birdseed Mining Student Instructions.” |
| 5-10 minutes | Teams set up their companies and obtain their “mining equipment.” |
| 15-20 minutes | Birdseed Mining activity - including calculation of costs and profit. |
| 5-10 minutes | Debriefing Activities |
| | ▶ Who made money? Who did not? Who got violations? |
| | ▶ How can you make the most money? Does equipment rental cost the company or make the company money? |
| | ▶ What decisions did you make as a team about the strategies to get the most minerals mined? |
| | ▶ How well did everyone work together to get the mining accomplished? |

Variations to the exercise depending on age group and ability level:

“How do I make the exercise harder?”

- ▶ Add a cost for rental of equipment from the equipment shed
- ▶ Add cost to bond the mine area that is released only if permit area is properly reclaimed (no seeds on the table or floor).
- ▶ Use less sunflower seeds
- ▶ Use smaller beads; less beads of each color; less value per bead or seed

“How do I make the exercise easier?”

- ▶ Give each mining team an allotment of usable mining equipment
- ▶ Increase the time to mine so more sunflower seeds can be mined
- ▶ Add more sunflower seeds to the birdseed mixture
- ▶ Use larger colored beads; more beads of each color; higher value per bead/seed

Birdseed Mining Student Instructions

Mining is a complex process in which relatively small amounts of minerals or metal ores are extracted or mined from large masses of rock. Sometimes these minerals are not easy to see. It can take considerable work to find and remove them from the surrounding rock. Once the mineral is removed, the land must be reclaimed. Mining is a very expensive process. The amount of mineral to be removed must have an economic value that can support the cost of mining and reclamation. If the mineral cannot be sold at high enough prices to cover mining costs, the operator may have to quit mining and perhaps go out of business. The closing of a mine will mean people lose their jobs causing a negative impact on their community and surrounding areas of the state.

Objective:

Your task will be to find the mineral(s) for which your team chooses to mine in the **cleanest, most environmentally conscious manner – and make money for your company.**

Instructions:

Your pan of birdseed (mine pit) contains hidden deposits of gold beads, silver beads, blue beads and white beads. The beads and seeds represent the following minerals and the value of each of these minerals.

Mineral values:

gold beads.....	gold.....	\$ 5.00 each
silver beads.....	silver.....	\$ 4.00 each
blue beads.....	copper.....	\$ 3.00 each
sunflower seeds	coal	\$ 2.00 each
all other seeds	mine waste.....	no value
white beads.....	reclamation credit.....	\$10.00 each

Costs of mining and reclamation:

basic mining cost.....	automatic charge	\$50.00 per mine pit
equipment rental.....	equipment shed.....	\$ 1.00 per piece of rented equipment
seeds off permit	penalty deduction	\$ 1.00 each violation ticket
other mining violations.....	penalty deduction	\$ 1.00 each violation ticket

Step 1: Set up your company. You will need:

- ▶ A CEO – to boss everybody and cheer them on
- ▶ A Controller – a “bead and seed” counter; calculates final costs and profit.
- ▶ Miners – those who will mine for the beads and seeds
- ▶ Environmental Control Specialists – to look for signs of mining off the permit and to fix any damage before the state inspector finds the violation.

Step 2: Name your company and write the name on the mining permit area. Decide what mineral(s) you will mine and if you need any special equipment. You may use any items your team already has in your desks, notebooks, pockets, purses, backpacks, and other items that have been given to you and special equipment rented from the equipment shed (if one is available.)

WAIT UNTIL ALL COMPANIES ARE READY TO BEGIN AT THE SAME TIME. If you begin early, you will be assessed a “not following directions” violation because you have begun mining before your permit has been reviewed and approved by the state government. If you remove seeds from the pie tin before the exercise begins, you will be assessed a violation for mining without an approved permit.

Step 3: Begin mining. A government inspector will tell you how many minutes you will have to mine for your minerals and reclaim your site. Reclamation means that all waste seeds are back in the “mine” (pie tin) and minerals have been sent to the controller. An alarm will sound indicating permitted time has expired. Further mining is a violation and penalties will be assessed. Reclamation may continue after the alarm sounds for a specific amount of time.

Step 4: On the “Birdseed Mining Financial Spreadsheet,” have the team controller calculate the value of the mined beads and seeds. Deduct the cost for mining and reclamation and any violations. Did the company make a profit?

Step 5: Sites will be inspected by the state mine inspector to ensure all reclamation is complete. Assess any final penalties for poor reclamation.

Leave all minerals collected at controller’s workstation for state government audit by the inspector.

Birdseed Mining Financial Spreadsheet

Gold beads equals GOLD

Number of Gold Beads _____ X \$5.00 each = \$_____

Silver beads equals SILVER

Number of Silver Beads _____ X \$4.00 each = \$_____

Blue beads equals COPPER

Number of Blue Beads _____ X \$3.00 each = \$_____

Sunflower seeds equals COAL

Number of Sunflower Seeds _____ X \$2.00 each = \$_____

Credit for Good Reclamation

Number of White Beads _____ X \$10.00 each = \$_____

Total Product Value = \$_____

SUBTRACT the following costs of mining:

Basic cost of mining and reclamation = \$ 50.00

Number of Violations _____ X \$1.00 each = \$_____

Cost of rental equipment:
Number of pieces _____ X \$1.00 each = \$_____

Total Cost of Mining/Reclamation = \$_____

Total Product Value: \$_____

Subtract ***Total Cost of Mining/Reclamation:*** — \$_____

Grand Total: Profit or (Loss) \$_____

Lessons Learned:

<div>\$1\$1</div> <div>Division of Reclamation</div> <div>VIOLATION</div> <div>\$1\$1</div>	<div>\$1\$1</div> <div>Division of Reclamation</div> <div>VIOLATION</div> <div>\$1\$1</div>	<div>\$1\$1</div> <div>Division of Reclamation</div> <div>VIOLATION</div> <div>\$1\$1</div>
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